



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,471	03/29/2004	Chellappa Balan	132749	9761
6/147 7590 06/10/2008 GENERAL ELECTRIC COMPANY GLOBAL RESEARCH PATENT DOCKET RM. BLDG. K1-4A59 NISKAYUNA, NY 12309				
EXAMINER				
NGUYEN, ANDREW H				
ART UNIT		PAPER NUMBER		
3746				
NOTIFICATION DATE		DELIVERY MODE		
06/10/2008		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ldocket@crd.ge.com
rosssr@crd.ge.com
parkskl@crd.ge.com

Office Action Summary

Application No.

10/810,471

Applicant(s)

BALAN ET AL.

Examiner

ANDREW NGUYEN

Art Unit

3746

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-22 is/are pending in the application.
- 4a) Of the above claim(s) 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

This is a second office action in response to applicant's reply filed on 3/25/08. Claim 8 has been cancelled. Claims 1-7 and 9-22 are pending.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-2, 5-6, 9, 13, 15, and 20-22 are rejected under 35 U.S.C. 102(b) as being anticipated by International publication WO 02/02460 A2 to Deckman et al.
(Deckman).

In reference to claim 1:

Deckman teaches:

A system for co-production of hydrogen and electrical energy comprising: a reformer (3) configured to receive a reformer fuel and steam (through feed 1, page 3, last paragraph) and produce a reformat rich in hydrogen (page 12 last paragraph - page 13 first paragraph); a separation unit (4) in fluid communication with said reformer wherein said separation unit is configured to receive said reformat to separate hydrogen from said reformat and produce an off gas (page 4 second paragraph); a combustor (5) configured to receive a fuel for

combustion and produce heat energy and a hot compressed gas (page 12 2nd paragraph - page 13 1st paragraph), wherein said combustor is coupled with said reformer (Fig 2; 3 and 5, page 12 last paragraph); and a gas turbine (204) to expand said hot compressed gas and produce electrical energy and an expanded gas (page 13 1st paragraph); wherein at least a part of said heat energy from said combustor is used to produce said reformat in said reformer (Pg 10, last paragraph - pg 11 1 st paragraph).

In reference to claim 2:

Deckman teaches:

The system according to claim 1 (see rejection of claim 1 above), wherein at least a part of said off gas is recycled back to said reformer after separation of hydrogen (pg 13 1st paragraph).

In reference to claim 5:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above) further comprising a heat exchanger (211, pg 13 1st paragraph) to generate steam.

In reference to claim 6:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above), wherein said separation unit further comprises a separating device selected from the group consisting of at least one chemical absorber, pressure swing adsorber, cryogenic separator, membrane separator (4) and liquefier.

Art Unit: 3746

In reference to claim 9:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above), wherein said expanded gas produced from said gas turbine comprises substantially low concentration of carbon dioxide (pg 12 2nd paragraph).

In reference to claim 13:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above), wherein said off gas from said separation unit is recycled into said combustor (pg 13 1st paragraph). The product of the reformer (6) will contain hydrogen. When the product is recycled back to the reformer (via line 219), some of the hydrogen in the recycled gas may be separated into H₂ and fed into the combustor.

In reference to claim 15:

Deckman teaches:

A system for co-production of hydrogen and electrical energy comprising: a reformer (3) configured to receive a reformer fuel and steam and produce a reformat rich in hydrogen
a combustor (5) configured to receive a fuel for combustion and produce heat energy and a hot compressed gas, wherein said combustor is coupled with said reformer; a separation unit (4) in fluid communication with said reformer wherein said separation unit is configured to receive said reformat to separate hydrogen from said reformat and produce an off gas, wherein at least a part of said heat

energy from said combustor is used to produce said reformat in said reformer (Pg 10, last paragraph - pg 11 1st paragraph); a gas turbine (204) to expand said hot compressed gas and produce electrical energy and an expanded gas; wherein at least a part of said heat energy from said combustor is used to produce said reformat (Page 10, last paragraph - page 11 1st paragraph) in said reformer and said separation un# is configured to separate carbon dioxide from said reformat and recycle at least a part of said off gas to said reformer (pg 13 2nd paragraph).

In reference to claim 20:

Deckman teaches:

A method for co-production of hydrogen and electrical energy comprising the steps of reforming a mixture of a reformer fuel and steam in a reformer and producing a reformat rich in hydrogen (pg 17 2nd paragraph); separating hydrogen from said reformat and producing an off gas (pg 17 2nd paragraph) combusting a fuel in a combustor and producing heat energy and a hot compressed gas, wherein said combustor is coupled with said reformer; and expanding said hot compressed gas in a gas turbine expanding and producing electrical energy and an expanded gas (pg 13 1st paragraph); wherein at least a part of said heat energy from said combustor is used to produce said reformat in said reformer (pg 10, last paragraph - pg 11 1st " paragraph)

In reference to claim 21 :

Deckman teaches:

Art Unit: 3746

The method according to claim 20 (see rejection of claim 20 above), comprising recycling at least a part of said off gas back to said reformer after separation of hydrogen (pg 13 2nd paragraph).

In reference to claim 22:

Deckman teaches:

A combustor reformer system comprising: a combustor (5) configured to receive a fuel and an oxidant for combustion and production of a hot compressed gas and heat energy, and a reformer (3) in intimate contact with said combustor, said reformer configured to receive a reformer fuel and steam and produce a reformat rich in hydrogen ; wherein said reformer is coupled with said combustor and at least a part of said heat energy from said combustor is used to produce said reformat in said reformer (Pg 10, last paragraph - pg 11 1st paragraph)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3-4, 7, 10-11, and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/02460 A2 to Deckman et al. (Deckman) as applied to

claim 1 above, and further in view of US Patent 4,622,275 to Noguchi et al.

(Noguchi).

In reference to claim 3:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above),

Deckman fails to teach:

wherein said reformat further comprises carbon monoxide, carbon dioxide and said reformer fuel

The reforming reaction taught by Deckman produces carbon dioxide and carbon monoxide (pg 15 2nd paragraph), but Deckman does not teach reformer fuel as a product. Noguchi teaches a fuel cell power plant in which one of the products of the reforming reaction is residual reactive gas which did not react (col 5 lines 29- 33 of Noguchi). It would have been obvious to one of ordinary skill in the art at the time of the invention that a reformat comprising reformer fuel would be a predictable result of a reforming process, since any non-perfect reformation would leave some residual reactive gas.

In reference to claim 4:

Deckman further teaches:

wherein said separation un# further comprises at least one water gas shift reactor (page 8 2nd paragraph + formula) to convert carbon monoxide to carbon dioxide to a hydrogen and carbon dioxide rich stream

In reference to claim 7:

Art Unit: 3746

Deckman further teaches:

wherein said separation unit is configured to separate carbon dioxide from said hydrogen and carbon dioxide rich stream (page 17 last paragraph).

In reference to claim 10:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above)

Deckman fails to teach:

further comprises a heat recovery steam generator (HRSG) to generate steam and a steam turbine.

Noguchi teaches a fuel cell power plant that comprises a reformer, gas turbine, waste heat recovery system - read as HRSG- (92), and a steam turbine (116). Noguchiteaches using the heat recovery system in order to recover heat from the exhaust of the gas turbine and increase thermal efficiency (col 2 lines 2-5 and col 4 lines 19-21 of Noguchi). The steam turbine is incorporated in the system to provide additional power output and thermal efficiency (col 9 lines 38-42 of Noguchi). It would have been obvious to one of ordinary skill in the art at the time of the invention to add the waste recovery system and steam turbine of Noguchi to Deckman's system in order to recover heat from the gas turbine exhaust, increase thermal efficiency, and increase power output.

In reference to claim 11:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above)

Art Unit: 3746

Deckman fails to teach:

wherein said hydrogen from said separation unit is used to operate a fuel cell system comprising one or more fuel cells to generate electrical energy.

Noguchi teaches a fuel cell power plant that comprises a reformer and a fuel cell.

A reformed gas including hydrogen is delivered from the reformer to the fuel cell. The fuel cell uses the hydrogen to create electric current (col 5 lines 24-28 of Noguchi). It would have been obvious to one of ordinary skill in the art at the time of the invention to add the fuel cell of Noguchi to Deckman's system in order to produce electric current.

In reference to claim 16:

Deckman teaches:

The system according to claim 15 (see rejection for claim 1 above),

Deckman fails to teach:

wherein said reformat further comprises carbon monoxide, carbon dioxide and said reformer fuel

The reforming reaction taught by Deckman produces carbon dioxide and carbon monoxide (pg 15 2nd paragraph), but Deckman does not teach reformer fuel as a product. Noguchi teaches a fuel cell power plant in which one of the products of the reforming reaction is residual reactive gas which did not react (col 5 lines 29- 33 of Noguchi). It would have been obvious to one of ordinary skill in the art at the time of the invention that a reformat comprising reformer fuel would be a predictable result of a reforming process, since any non-perfect reformation would leave some residual reactive gas.

In reference to claim 17:

Deckman further teaches:

wherein said separation unit further comprises at least one water gas shift reactor to convert carbon monoxide to carbon dioxide to a hydrogen and carbon dioxide rich stream (pg 8 2nd paragraph in Deckman).

In reference to claim 18:

Deckman further teaches:

wherein said separation unit further comprises a separating device selected from the group consisting of at least one chemical absorber, pressure swing adsorber, cryogenic separator, membrane separator (4 in Deckman) and liquefier

In reference to claim 19:

Deckman further teaches:

wherein said separation unit is configured to separate carbon dioxide from said hydrogen and carbon dioxide rich stream (pg 17 2nd paragraph in Deckman)

5. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/02460 A2 to Deckman et al. (Deckman) as applied to claim 1 above, and further in view of US Patent Application Publication 2004/0031388 A1 to Hsu.

In reference to claim 12:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above)

Deckman fails to teach:

further comprising a hydrogen storage unit

Hsu teaches an energy supply system comprising a reformer and a fuel cell. The reformer outputs a reformed fuel, hydrogen,, which can be stored in a fuel storage unit (322, col 7 lines 6-9 of Hsu). It would have been obvious to one of ordinary skill in the art at the time of the invention to add the fuel storage unit of Hsu to the system of Deckman in order to store the hydrogen from the reformer.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 02/02460 A2 to Deckman et al. (Deckman) as applied to claim 1 above, and further in view of US Patent 5,938,800 to Verrill (Verrill).

In reference to claim 14:

Deckman teaches:

The system according to claim 1 (see rejection for claim 1 above),

Deckman fails to teach:

wherein said off gas is burned in a secondary combustor

Verrill discloses a reformer that separates hydrogen from an off gas. The hydrogen is used in a fuel cell. The off gases are combusted in a burner- read as combustor- (col 3 lines 42-45 of Verrill). It would have been obvious to one of ordinary skill in the art at the time of the invention to add the burner of Verrill in the system of Deckman in order to combust the off-gases produced in the reformer as taught by Verrill.

Response to Arguments

7. Applicant's arguments filed 3/25/08 have been fully considered but they are not persuasive.
8. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "the combustor does not use the hydrogen as fuel") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).
9. In response to applicant's argument that "in contrast the system disclosed in the present application produces hydrogen and electricity", examiner points out that Deckman produces both hydrogen and electricity. Applicant acknowledges this in the preceding paragraph (page 6 -7 of "Remarks/Arguments") when applicant says the "system disclosed by Deckman shows a heat exchanged membrane reactor that employs thermal or catalytic steam reforming of a hydrocarbon feed to **produce hydrogen** ... The combustion product is used to power a turbine for **generating electricity**". The two elements which applicant argues distinguish the application from the prior art are present in the prior art.
10. The claims depending from 1 and 15 are not in condition for allowance, since the limitations of claims 1 and 15 have not overcome the prior art.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **ANDREW NGUYEN** whose telephone number is (571)270-5063. The examiner can normally be reached on 8 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art
Unit 3746

/AN/